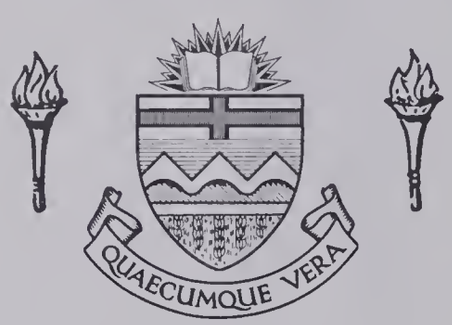

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COGNITIVE CONFLICT BETWEEN MALES AND FEMALES

BY

© JOSEPH EISENBERG

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Cognitive Conflict Between Males and Females" submitted by Joseph Martin Eisenberg in partial fulfilment of the requirements

ABSTRACT

This experiment was conducted to determine whether sex differences existed in a cognitive conflict situation employing Hammond's paradigm. The experimental procedures involved four conditions; linearity and nonlinearity of the stimulus materials and the sex of the subject (male or female). The linear condition consisted of learning a positive linear relationship between the stimulus and the criterion, while the nonlinear condition consisted of learning a nonlinear relationship (inverted-U).

After having learned to use either the linear or nonlinear relationship, subjects were brought together in pairs, one subject trained in the linear condition and the other in the nonlinear condition, in order to make decisions concerning the state of political affairs of hypothetical nations. A total of 40 pairs, 40 males and 40 females, were run with subjects randomly assigned to one of four groups; male-male, male-female, female-male, and female-female. The first member in each pair was run in the linear condition and the second member in the nonlinear condition.

Eight measures were derived from the data collected during the conflict stage. Except for two measures of accuracy, there was no demonstration of significant main effects or interactions for groups. The sex differences that were found indicated that perhaps there was an inability of females to communicate effectively a difficult political policy due to the partners', either males or females, unwillingness to accept the communication.

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Introduction

Individuals in their everyday existence are faced with a variety of situations, the most important of which may involve cognitive conflict (two or more individuals with different cognitive systems attempting to deal with the same problem). Decisions are made by individuals on the basis of a variety of information, some of which is adequate in leading to the achievement of a goal. The decisions made are often in disagreement with those of others due to the differing cognitive systems, e.g., deciding on what graduate school to attend, who to marry, the best locality to raise a family. Unfortunately, it appears that the resolution of such conflict required skills which, at present, most individuals do not have.

As Hammond (1965) points out, there are a variety of reasons why man lacks the ability to resolve cognitive conflict, but the one that concerns psychology is his lack of scientific knowledge as to how to do it. Hammond adds, "not only is our knowledge fragmentary and unsystematic, but we are making few and feeble scientific preparations to increase it" (p. 47). He then presents a research paradigm designed to increase the understanding of cognitive conflict and its peaceful resolution.

His paradigm is based on Brunswik's lens model (1952, 1956) which involves the major concept of probabilistic functionalism, and argues that the environment is a "semi-erratic medium" to which man must adapt in a probabilistic "uncertainty-geared" manner. Man must use a variety of information, which Brunswik defines as cues, in his environment which are related to the achievement of a goal in varying degrees (see Fig. 1).

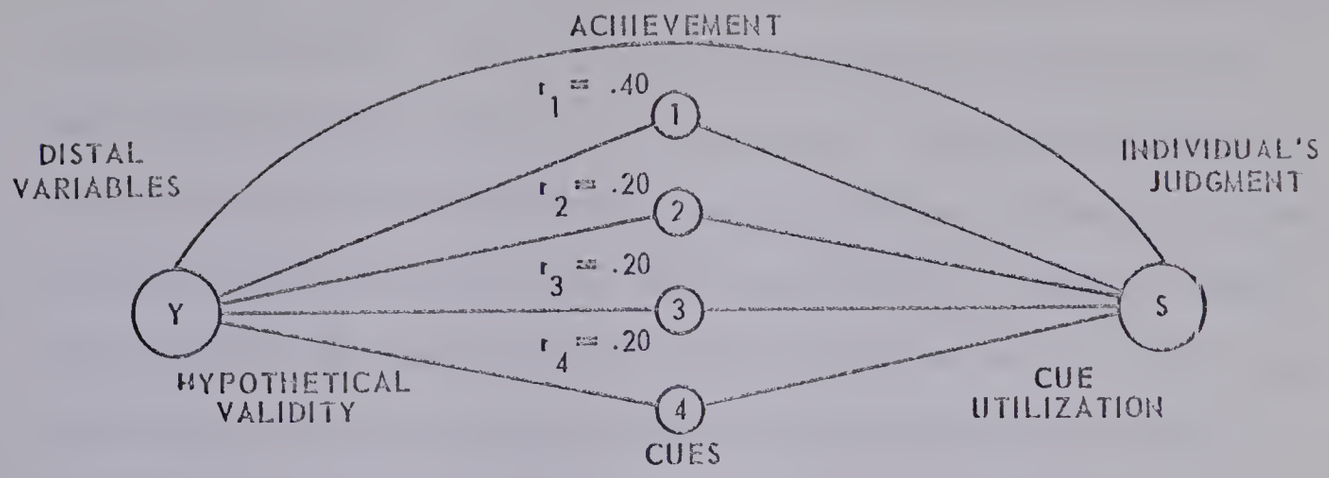

FIGURE 1 BRUNSWIK'S LENS MODEL SHOWING DIFFERENT CUE-WEIGHTS FOR THE ACHIEVEMENT OF A TASK.

Since the cues in the environment are not "certainty-geared", man must find some means of dealing effectively with them. The lack of certainty can be seen in the examples stated above concerning cognitive conflict. The fact that one does not always choose a compatible mate, the most inhabitable environment, or the most appropriate graduate school reflects the uncertainty.

Hammond's paradigm, in addition to dealing with probabilistic functionalism, involves another aspect of conflict: past experience being only apparently appropriate for dealing with a set of problems. Man faces changing conditions in his environment, since the similarity of present problems to those of the past is often more apparent than real. Appropriate behavior may have been found to deal with the uncertainty in one situation, but for another similar situation the cues may be slightly different. Thus the relative importance of a given set of cues may have changed, so that the environment requires cognitive change to deal with environmental change.

The paradigm also represents a situation in which no differential payoff is involved. Thus the cognitive system is conceptualized as a result of the demands of the paradigm. The present emphasis is on personality structuring and not motivation, although differential motives may be superimposed on the present model. Rappoport (1968) has done this by paying subjects both for the accuracy of their joint decisions and also for persuading their partner to depart from training.

Hammond's research paradigm used to study cognitive conflict consists of a situation in which two individuals attempt to solve common problems on the basis of prior, indivudal training on problems which appear similar to those they must jointly solve. In the individual training period, each subject receives different training as to the solution of problems involving uncertain inferences. After training, two subjects are brought together and find themselves confronted by familiar problems, which they are apparently prepared for, yet their solutions do not coincide with one another and do not solve the problems. Their solutions, however, do remain defensible. They must thus work together to arrive at a joint decision as to the correct answer, and consequently adapt to one another and the task situation.

The experimental method for the paradigm involves a training stage and a conflict stage. During the former, two subjects are trained to develop different cognitive systems in relation to the same problem. This is achieved by having each subject learn to use a different cue from a common set of cues, with cognitive conflict

being established as the difference between the training for each subject. Thus after subjects learn their respective systems, the degree of cognitive conflict may be stated by the relative difference between the two systems.

After subjects have completed their training, they are brought together to apply their training to a "similar" set of problems. They are told to observe the situation represented by the stimulus materials and separately form a private judgment. The difference between the judgments serves as a measure of conflict between the subjects. After their separate judgments are made, they are then disclosed to their partner and a joint decision is reached if their initial judgments differ. The subjects are permitted to discuss the situation freely during the joint decision. This decision serves as the measure of compromise, since both subjects have to reach a joint decision. After the joint decision is made, they make a second private judgment which is never revealed to their partner.

The materials are so arranged that the correct answer for a given trial is set mid-way between both the positions given by training of the subjects. The accuracy of any of the subjects' judgments may thus be determined by comparing a given judgment to a point which lies between both subjects' positions developed during training. During the conflict stage, the problems are only "similar" to those of the training stage, since neither system developed during training for each subject is more valid. Either position will not, by itself, permit a subject to make an accurate judgment. Only by taking both positions together can correct judgments be made.

Previous research with this paradigm has used all male groups in the United States and Europe (Hammond, Todd, Wilkins, and Mitchell, 1966; Hammond, Bartoli Bonaiuto, Faucheux, Muscovici, Fröhlich, and Joyce, 1968). No research, however, has been done using this paradigm in reference to sex differences. In the areas of cognitive functioning and conformity, one might expect to find that males tend to function somewhat differently than do females, since males have been found to view tasks differently as compared to females (Vinacke, 1959; Bond and Vinacke, 1961; Uesugi and Vinacke, 1963; Vinacke and Gullickson, 1964).

Wallach and Caron (1959) and Wallach and Kogan (1959) found females employed narrower cognitive categories than males. Similarly females appeared more susceptible to set formation with a greater inability to change sets once established (Guetzkow, 1951; Luchins and Luchins, 1959). Males have also been found to be better at deductive reasoning (Kostick, 1954) and problem solving in general (Nakamura, 1958).

The above studies would indicate that males and females differ as to the form of their cognitive structuring. Although it could be argued that the type of task used in some problem-solving experiments favored the male subjects, Nakamura (1958) varied the type of problems employed so that in some instances they favored the female subjects, e.g., problems concerning home economics. Male superiority even in these problems would argue against sex differences being the result of task properties per se.

Nakamura also found females to be more conforming. This finding was substantiated by Allan and Crutchfield (1963). Nakamura

employed problems requiring no restructuring, problems requiring restructuring, and analogies, while Allan and Crutchfield employed perceptual judgments and vocabulary-meaning judgments. Therefore, conformity appeared to be a function of the individual and not the task, since a variety of different tasks were employed in both experiments.

The differences in the amount of conformity would indicate that females resolve conflict differently than males, and also that they tend to adapt to cognitive situations differently, which is consistent with the previously mentioned studies concerning cognitive structuring. It would appear then that there is ample evidence to suggest that males and females would react differently in a cognitive conflict situation. On the basis of the above evidence, the present study addresses itself to the question of whether sex differences exist in a cognitive conflict situation employing Hammond's paradigm.

Method

Subjects

The Ss were selected from an Introductory psychology course at the University of Alberta, part of the requirement of which consisted of experimental participation. The sample consisted of 40 males and 40 females. Eleven further pairs of subjects were run through the training task but rejected when one or the other member failed to meet the training criterion of no more than three incorrect responses on the last 20 trials of training.

Design

Ten pairs of Ss were randomly assigned to each of four groups; a male-male (MM), a male-female (MF), a female-female (FF), and a female-male (FM) group. The first member of each pair was trained in the linear condition, while the second member was trained in the nonlinear condition, e.g., MF group in which the male was run in the linear condition and the female in the nonlinear condition. Thus a total of 40 subjects, 20 males and 20 females, were run under each condition.

The basic data collected in this paradigm (all drawn from the conflict stage) are as follows:

a) T_1: The response Subject 1 would make to the cue values if he followed his training exactly.

b) T_2: The same for Subject 2.

c) S_1: The response Subject 1 makes to the cue-value and which he announces to Subject 2.

d) S_2: The same for Subject 2.

e) J : The joint decision arrived at by the two subjects.

f) S_1': The covert response Subject 1 makes privately after hearing Subject 2's response, hearing Subject 2's arguments, and concurring in a joint decision with him.

g) S_2': The same for Subject 2.

h) Y : The "correct" answer if there were no random errors in the feedback situation.

i) $\hat{Y}$: The answer given to both subjects which includes error in the problem system. Random differences between Y and $\hat{Y}$ prevent perfect solution.

These scores are diagrammatically presented in Figure 2.

The difference between scores T_1 and T_2 indicates the degree to which subjects have acquired the potential for cognitive conflict. It is a prcise quantitative statement of the differences between two specific subjects. T is calculated by using the multiple regression equations for the training tasks and extending this through the cue values of the conflict task.

The joint decision (J) provides an essential element of the paradigm. It indicates the objective outcome of the discussion precipitated by the individual judgments (S).

Measures of conflict and compromise can be derived from the basic data. Conflict would be given by $S_1 - S_2$ and is directly affected by $T_1 - T_2$, since the comparison of T_1 and T_2 indicates what the differences between the subjects' responses would have been if they had followed their training exactly. A measure of compromise is given by S - J.

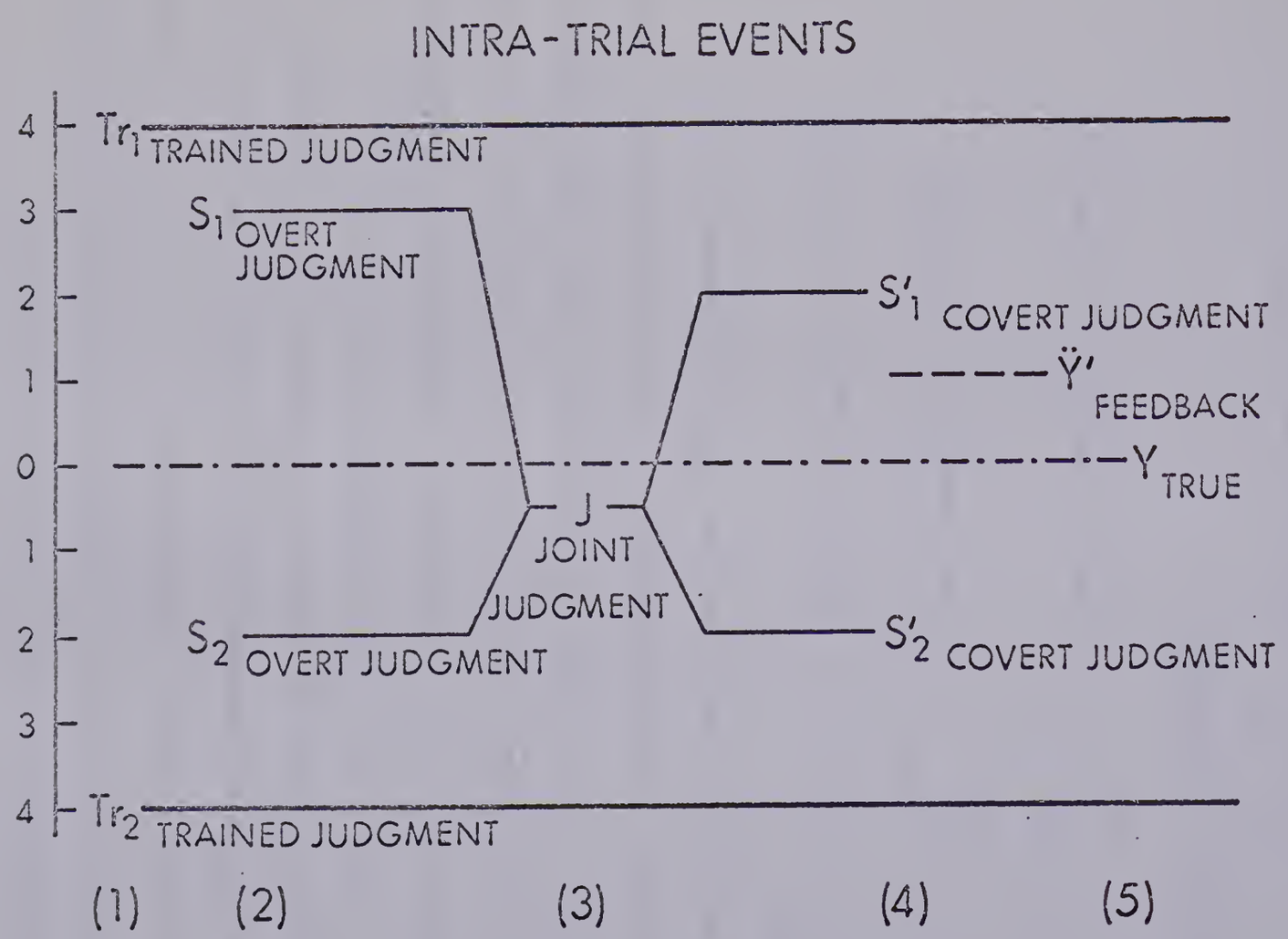

FIGURE 2: BASIC DATA OBTAINED ON A SINGLE TRIAL.

A comparison of individual judgments and joint devisions provides a measure of compromise, since if J falls midway between S_1 or S_2, this would indicate increasing compromise. If J falls closer to either S_1 or S_2, one would find increasing capitulation. These same relationships apply to the covert measures.

The actual values for conflict are expressed as the difference between each subject's judgments (e.g., $S_1 - S_2$, $S_1 - J$) divided by the difference between the judgment each subject would have made if he had followed the policy he developed during training ($T_1 - T_2$ and $T_1 - J$). Thus, overt conflict is measured by $\frac{S_1 - S_2}{T_1 - T_2}$, covert conflict by $\frac{S_1' - S_2'}{T_1 - T_2}$. Compromise is indicated as a reduction of these values over trials. In all as many as 20 measures may be derived from the conflict stage. In the present study eight measures were taken during the conflict stage, as they were deemed most appropriate for the present considerations. The eight measures were:

Accuracy

1) $|J - Y|$: Accuracy of the joint decision.

2) $\frac{|S_i - Y|}{T_i - Y}$: Overt accuracy or adaptation.

3) $\frac{|S_i' - Y|}{T_i - Y}$: Covert accuracy or adaptation.

Conflict and Compromise

4) $\frac{|S_1 - S_2|}{T_1 - T_2}$: Amount of overt conflict.

5) $\frac{|S_1' - S_2'|}{T_1 - T_2}$: Amount of covert conflict.

6) $\frac{|S_i - J|}{S_1 - S_2}$: Amount of compromise.

Cognitive Change

7) $\frac{|S_i - S_i'|}{S_i - J}$: Change between overt and covert judgments.

8) $\frac{|T_i - J|}{T_1 - T_2}$: Amount joint decision varies from training.

Most of the measures were subjected to an arc-tangent transformation before any analysis was done. This was done to make the sampling distribution more normal and keep the data within a range of zero to two. Without the transformation the data has an extended range of one to infinity. The data was also organized into 10 blocks of two trials each.

The analysis consisted of two factorial designs. The first was a 2x2x10 with two levels of sex of subjects and two levels of sex of partner as the between subjects component and the ten blocks of trials as the within subjects component. This analysis dealt with the data obtained from pairs of Ss: $|J - Y|$, $\frac{|S_1 - S_2|}{T_1 - T_2}$, and $\frac{|S_1' - S_2'|}{T_1 - T_2}$. The second design dealt with individual data: $\frac{|S_i' - Y|}{T_i - Y}$, $\frac{|S_i - Y|}{T_i - Y}$, $\frac{|S_i - J|}{S_1 - S_2}$, $\frac{|S_i - S_i'|}{S_i - J}$ and $\frac{|T_i - J|}{T_1 - T_2}$. The analysis was treated as a 2x2x10

factorial design with two levels of sex of the subject and two levels of the sex of partner as the between subjects component and ten pairs of subjects as the winthin subjects component. Using this arrangement, two separate analyses were run, one for the linear condition and one for the nonlinear condition for individual subjects as compared to the previous design dealing with pairs of subjects.

Materials

The experimental task involved political decision making, with reference to hypothetical nations. The materials consisted of three decks of stimulus cards and one criterion card; two decks for the training and one for the conflict stage, with the criterion card being used in both phases. The training decks were constructed to present the subjects with two cues; one of which was linearly related to the criterion of the "level of democratic institutions," while the other was related in a nonlinear fashion. One deck emphasized the importance of the linear cue while the other deck emphasized the importance of the nonlinear cue.

The card representing the criterion of "level of democratic institutions" consisted of one graph (see Appendix A). The graph was divided into five categories with four steps within each category. The lowest level on the graph was "rule by one", and the highest level was "full representation". The four steps within each category represented the degree of that category, with one as the smallest degree and four as the largest degree. The subject made his judgment of the "level of democratic institutions" by selecting a category and a step within a category. Thus a subject who chose "rule by

one, 2" was choosing a lower "level of democratic institutions" than a subject who chose "rule by committee, 4."

The linear cue was that of "free elections" represented on the two decks of cards by a bar graph consisting of five categories with two steps within each category (see Appendix B). The lowest level of elections was "nominal" and the highest was "election of legislative and all other branches". For subjects learning this task, the stimulus deck was constructed in such a way that the cue of "free elections" accounted for 98% of the variance in the criterion: as the level of elections increased, the criterion increased proportionately (see Fig. 3).

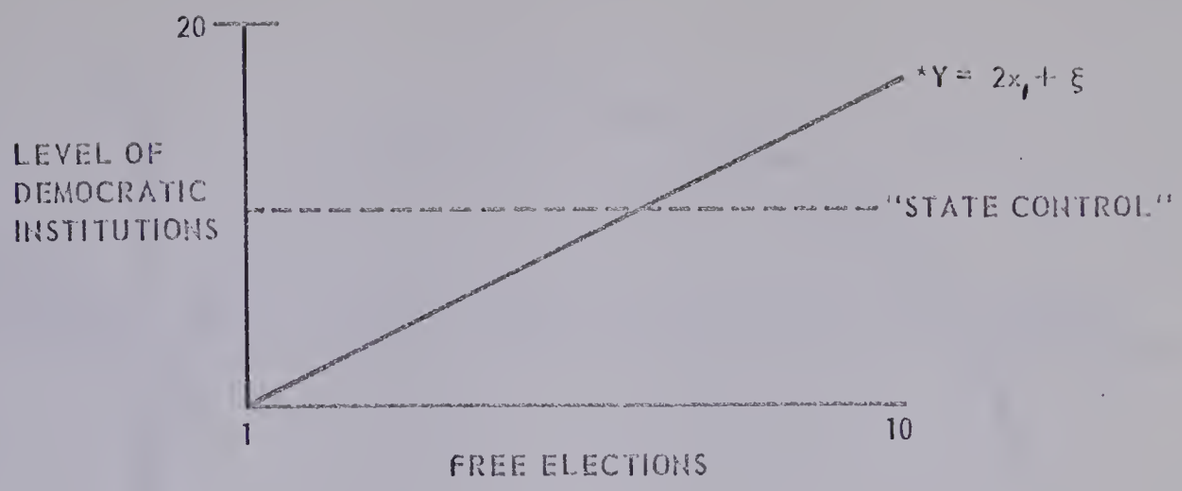

FIGURE 3 FUNCTION FORM FOR THE SUBJECT TRAINED ON THE LINEAR CUE OF "FREE ELECTIONS".

Since the second cue of "state control" was randomly related to the criterion in this condition, the subject trained in this fashion built up a high degree of dependency on the free elections as a predictor of the "level of democratic institutions". The cue of "state control" played no functional role in predicting the criterion for subjects trained in this condition.

The nonlinear cue was the extent to which "state control" was a factor in government and was represented on the cards in the same fashion as was the linear cue (see Appendix B). The deck emphasizing the nonlinear cue trained the subject to depend on "state control" as the predictor in such a fashion that both high and low levels of "state control" predicted a low level of the criterion, while a moderate level predicted a high level of the criterion,

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*X_1 = a given value for the linear cue.

ξ = random error with $\bar{X} = 0$ and a standard deviation = 1.

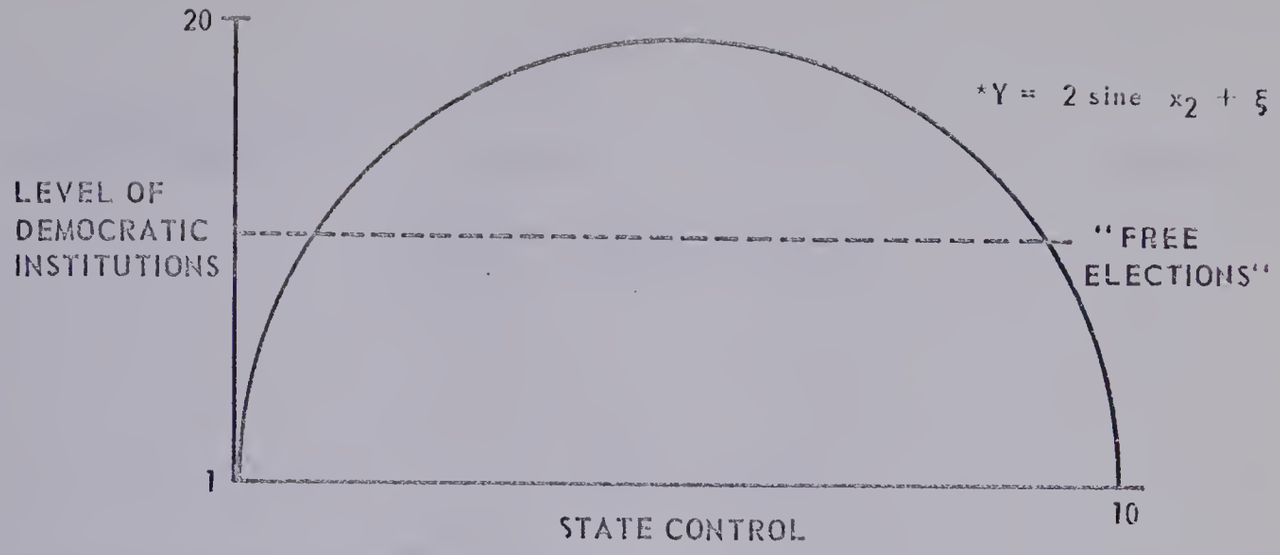

FIGURE 4 FUNCTION FORM FOR THE SUBJECT TRAINED ON THE NONLINEAR CUE OF "STATE CONTROL".

(see Fig. 4).

A third deck of stimulus cards was used during the conflict phase. While it appeared similar in form to both the decks used in training, the cue validities were changed. Both "free elections" and "state control" accounted for 49% of the variance in the criterion and thus contributed equally to the prediction of the "level of democratic institutions" while maintaining their linear and nonlinear properties respectively (see Fig. 5).

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* X_2 = a given value for the nonlinear cue.

ξ = random error with $\bar{X} = 0$ and a standard deviation = 1.

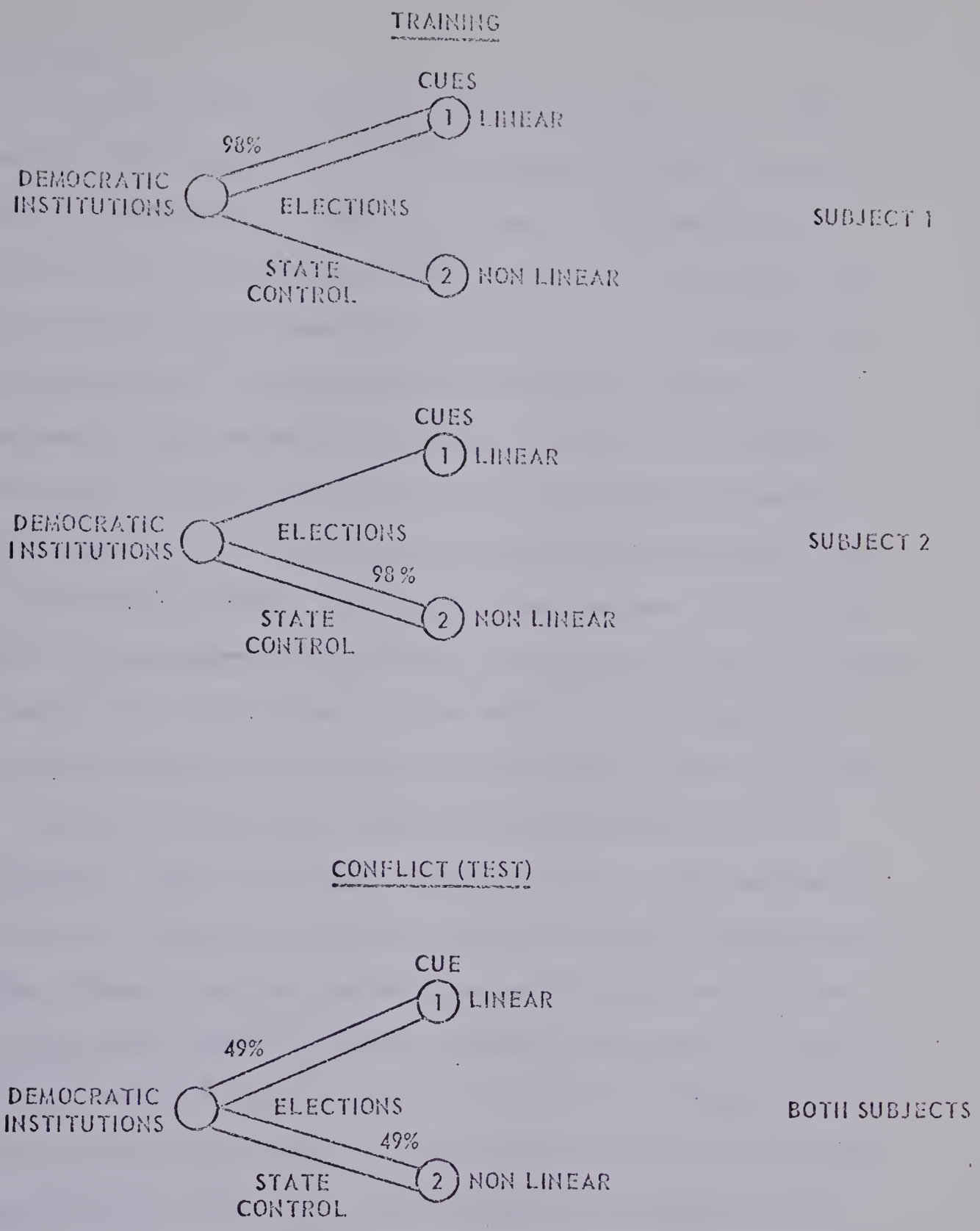

FIGURE 5 CUE VALIDITIES DURING TRAINING AND CONFLICT STAGE

Procedures

Subject 1 received training on the task involving the linear variable, while Subject 2 received training on the task involving the nonlinear variable. Each subject was given immediate feedback as to the correct answer after each trial. Both subjects were given the same set of instructions (see Appendix C), and both were trained to meet a criterion determined during the experiment and confirmed in the preliminary analysis of the data. The subjects were given 60 trials, and a template was then used to determine if the answers to the last 20 trials were within an acceptable range of three steps on either side of the correct answers. If more than three of the answers were not within an acceptable range, an additional 20 trials were administered. If the subject's performance had not met the criterion after the additional 20 trials, the pair was rejected.

After the subjects had reached the predetermined level of performance, they were brought together in pairs. The experimenter then read a standard set of instructions to the pair (see Appendix D) which informed them that they had grasped the policy and were now to apply their policy to problems involving real nations. A stimulus card was presented from the conflict deck, and each subject recorded an individual judgment (S_1 , S_2) predicting the "level of democratic institutions". Each subject then presented his judgments to the other, after which they discussed the differences between judgments until a joint decision (J) was reached. Each then recorded

a second private decision (S_1, S_2) which was not revealed to the other subject. The experimenter then reported the correct answer thus ending the trial. The stimulus card was then withdrawn and another presented. This procedure was followed until a total of 20 trials had been completed.

Results

The analysis of the data obtained during training showed that subjects had developed appropriate cue dependencies. The mean correlation between the linear variable, "free elections," for subjects trained in the linear condition was .97 with a range of .89 to .99, while for the nonlinear variable, "state control," the mean correlation was -.13 with a range of -.01 to -.22[1]. For subjects trained in the nonlinear condition, the mean correlation values were .95 with a range .77 to .99 for the nonlinear variable and -.09 with a range of -.28 to +.07 for the linear variable.[2] The multiple correlation between both cues and the criterion ranged from .73 to .99. For the eleven pairs of subjects rejected, subjects trained in the nonlinear condition who had failed to learn their policy accounted for all the rejections.

All analyses showed a significant blocks effect with the exception of the measure of cognitive change between the overt and covert judgments $\left(\left|\frac{S_i - S_i'}{S_i - J}\right|\right)$ which showed no signficant differences of any sort. In addition, except for measures of accuracy, there were no significant main effects or interactions for groups. The two measures of accuracy that did demonstrate group effects

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[1] In calculating the mean correlations, r's were transformed to z scores and reconverted after the calculations had been completed.

[2] Correlations for the nonlinear variable were calculated after data had been re-transformed to a linear function.

were the measure of joint accuracy (J - Y) and the measure of covert accuracy $\left(\left|\frac{S_i' - Y}{T_i - Y}\right|\right)$ for subjects trained in the linear condition.

For the measure of the accuracy of the joint decision, groups with a female subject trained in the nonlinear condition were less accurate than groups in which male subjects were trained in the nonlinear condition (see Tables 1 and 2; Fig. 6). The measure of covert accuracy demonstrated a similar finding. Subjects trained in the linear condition were less accurate in their covert judgments when their partner was female (.672) than when their partner was male (.564) and trained in the nonlinear condition (see Table 3 and Fig. 7). Only block effects were present for the measure of overt accuracy $\left(\left|\frac{S_i - Y}{T_i - Y}\right|\right)$.

Table 1

Means for the Accuracy of the Joint Decision (J - Y)[3]

	Linear Male	Linear Female
Nonlinear Male	1.745	1.795
Nonlinear Female	2.130	2.140

The general finding of a significant block effects indicated that subjects' behavior varied over trials as a function of being in the experiment. This effect was not interpreted, but Figure 6 gives an example of what occurred.

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[3] J - Y data were not subjected to an arc-tangent transformation.

Table 2

Summary Table for the Analysis of Variance for the Measure of the Accuracy of the Joint Decision ($|J - Y|$)

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.09	1	.09	.04
Sex of Partner	13.32	1	13.32	5.26*
Sex of S x Sex of Partner	.04	1	.04	.02
Error Term Between Groups	91.19	36	2.53	---
Blocks	123.56	9	13.73	12.91**
Blocks x Sex of S	5.22	9	.58	.55
Blocks x Sex of Partner	4.57	9	.51	.48
Blocks x Sex of S x Sex of Partner	4.55	9	.51	.48
Error Term Within Groups	344.56	324	1.06	---

*p < .05
**p < .01

Table 3

Summary Table of the Analysis of Variance for Covert Accuracy $\left(\frac{|S - Y|}{T - Y}\right)$ For Subjects Trained in the Linear Condition

Source of Variation	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.02	1	.02	.21
Sex of Partner	1.16	1	1.16	8.99**
Sex of S x Sex of Partner	.03	1	.02	.23
Error Term Between Groups	4.68	36	.13	---
Blocks	2.27	9	.25	4.63**
Blocks x Sex of S	.10	9	.01	.21
Blocks x Sex of Partner	.54	9	.06	1.11
Blocks x Sex of S x Sex of Partner	.22	9	.02	.45
Error Term Within Groups	17.63	324	.05	---

** p < .01

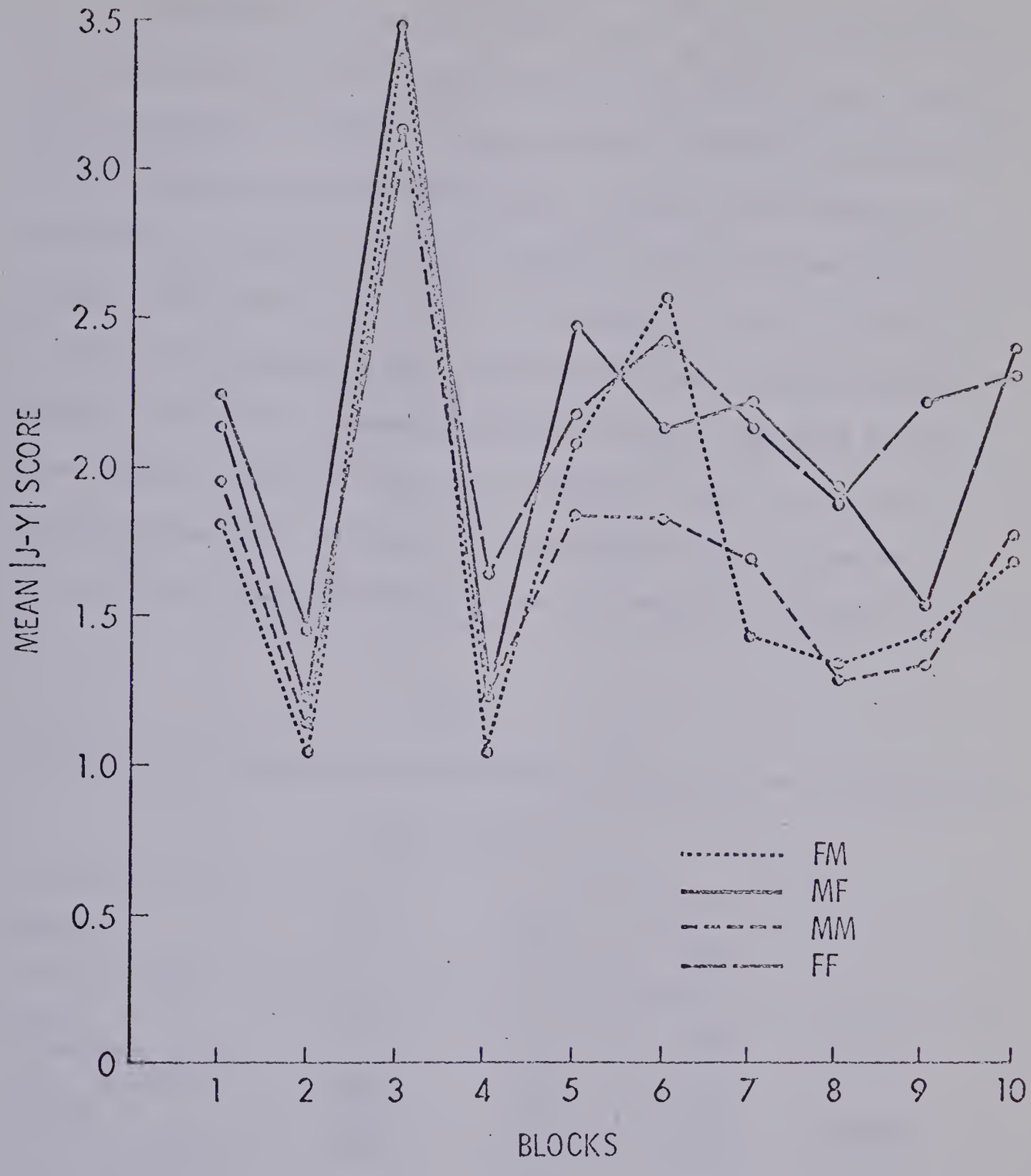

FIGURE 6 ANALYSIS OF THE ACCURACY OF THE JOINT DECISION

Canadian vs. United States and Swedish Samples

A comparison between the conflict data $\frac{|S_1 - S_2|}{T_1 - T_2}$ collected in this study for all four groups and that of previous research using this paradigm in the United States and Sweden[4] showed no significant group differences but did demonstrate a trials effect which was expected (see Table 4). Table 4 includes only the United States vs. Canada. The form of the curves of the Canadian sample was similar to that of the Swedish sample and differed from the United States sample only in the increased conflict shown over the final 8 trials (see Fig. 8). Figures 8 and 9 have trials arranged in the form of running means, since the data for the United States and Sweden had been previously arranged and could not be converted to blocks of trials.

Table 4

A Comparison Between the United States and Canada for the Measure of Overt Conflict

Source	SS	DF	MS	F
Group	.048	1	.048	3.78
Error Term Subj. W. Groups (1)	.605	48	.013	
Blocks	.308	9	.034	6.99**
Blocks by Groups	.040	9	.004	.90
Blocks x Subj. W. Groups (2)	2.117	432	.005	

** $p < .01$

[4]Grateful acknowledgement is made to Kenneth R. Hammond, of the University of Colorado, for providing these data.

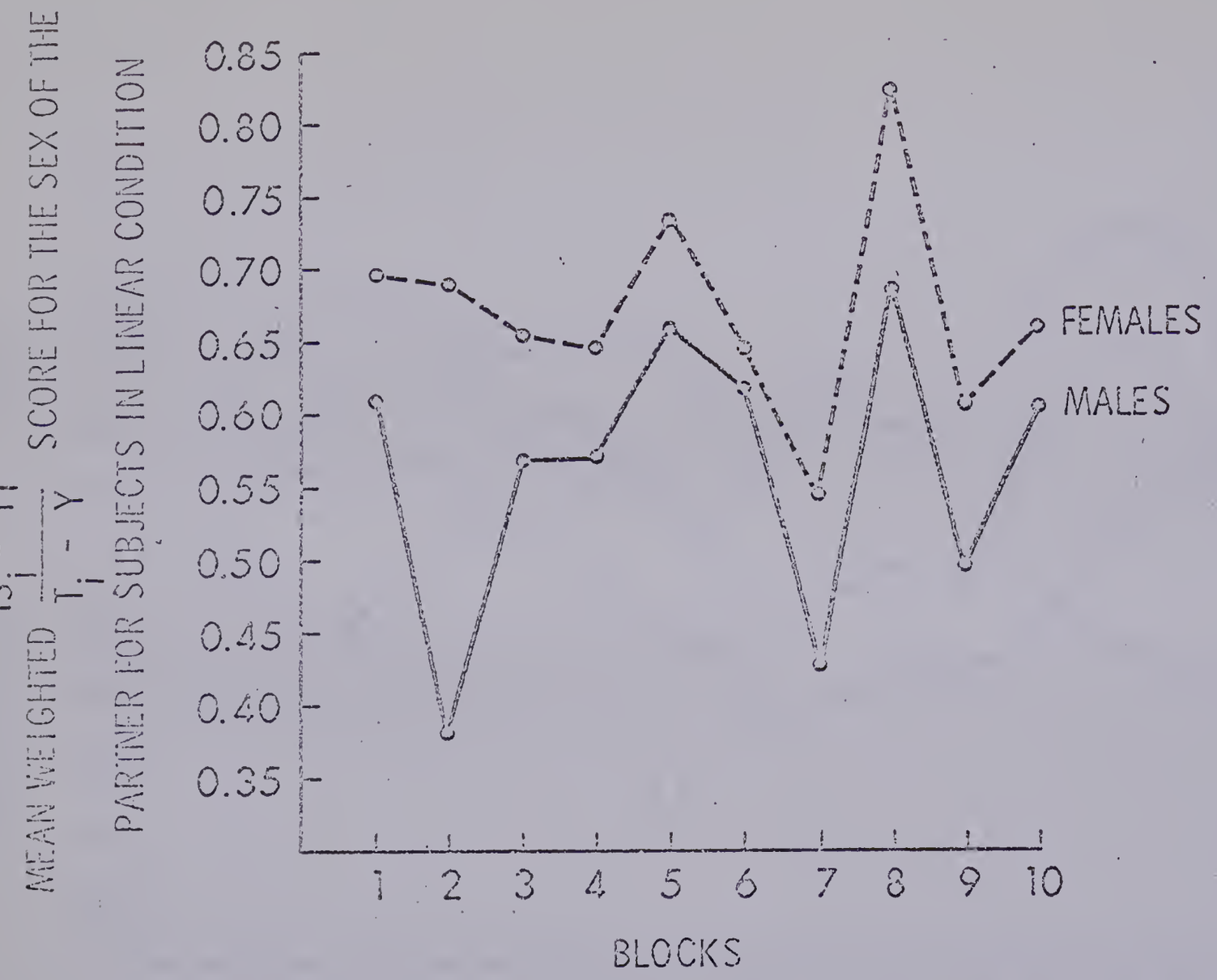

FIGURE 7: ANALYSIS OF COVERT ACCURACY AS A FUNCTION OF SEX OF PARTNER FOR SUBJECTS IN THE LINEAR CONDITION.

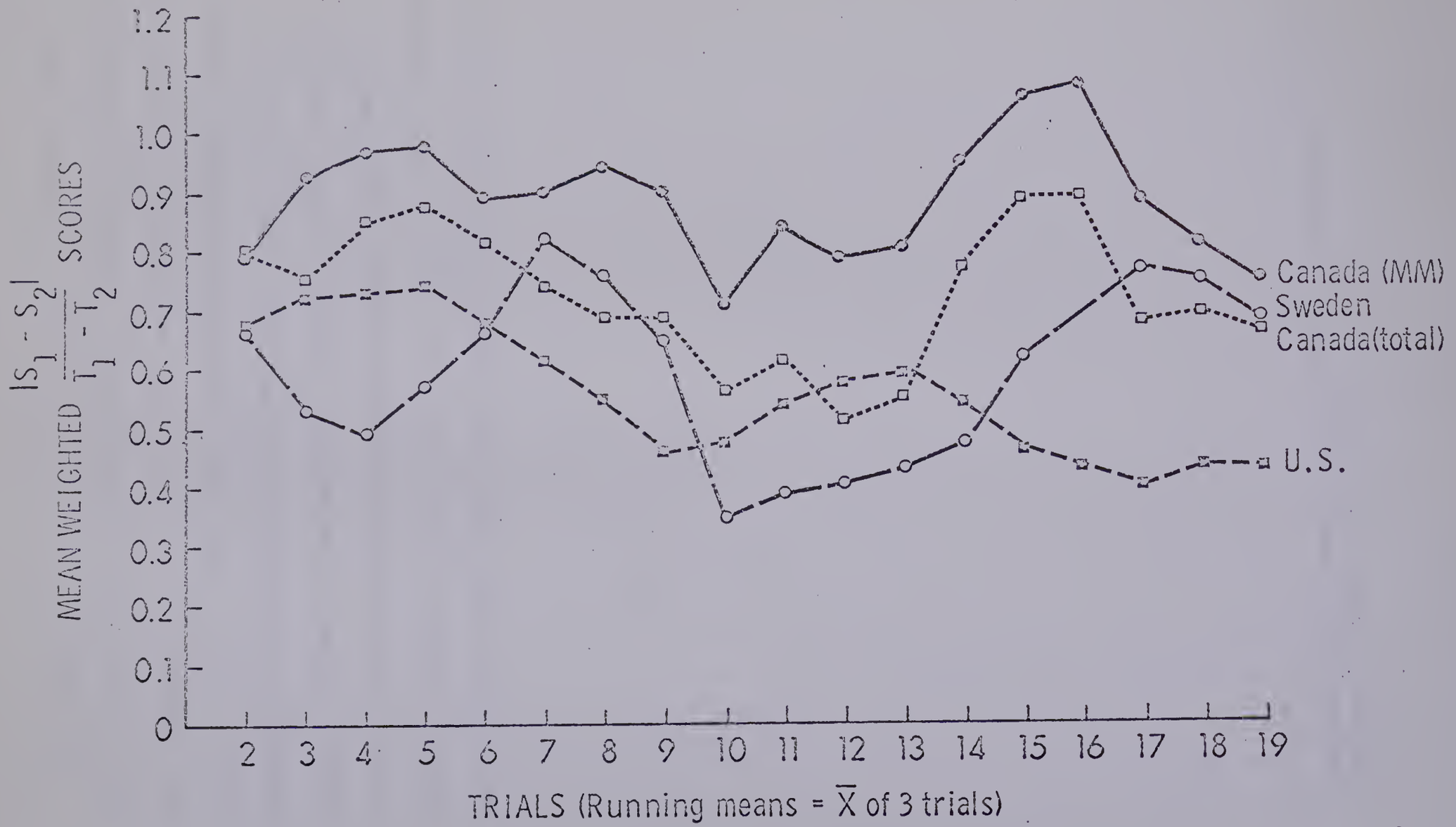

FIGURE 8 COMPARISON BETWEEN CANADA, SWEDEN, AND THE UNITED STATES FOR THE MEASURE OF OVERT CONFLICT.

For illustrative purposes the comparison of the male-male group of the Canadian and United States[5] samples for the measure of overt accuracy was made to show the similarity in performance between subjects trained in the linear and nonlinear condition (see Fig. 9). Performance was similar for the first half of the trials, for subjects trained in the nonlinear condition, even to the point of showing an increase in adaptation between trials seven to eleven. However, the Canadian male-male group was far less accurate over the final eight trials than subjects in the United States sample.

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[5] U.S. data from Hammond, K.R. Cognition and Conflict (Institute of Behavioral Science, Report 100).

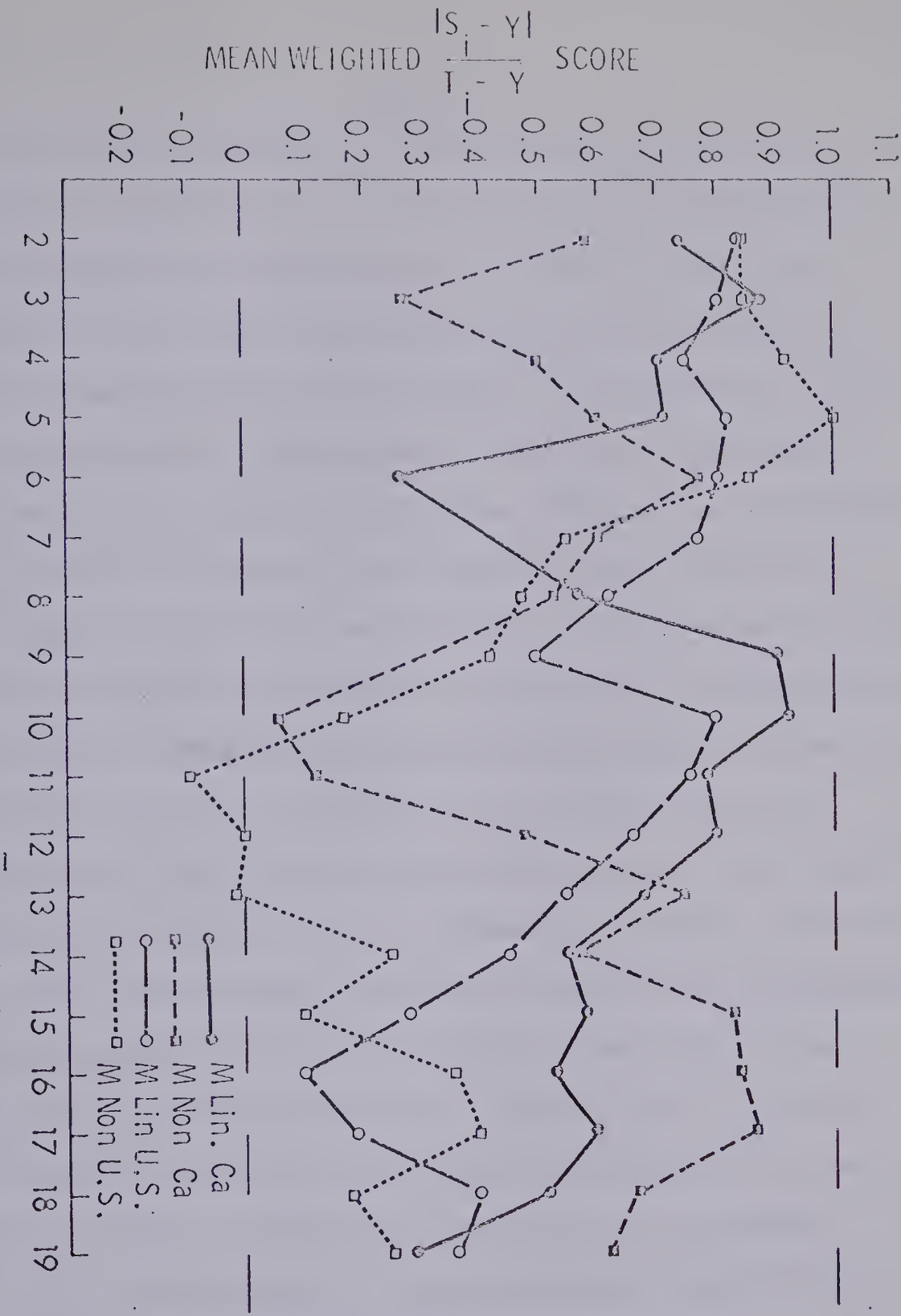

FIGURE 9 COMPARISON OF ADAPTION SCORES OF LINEAR AND NONLINEAR SUBJECTS FOR THE CANADIAN MALE-MALE GROUP AND THE UNITED STATES SAMPLE

Discussion

The general consistency of the data from this study with that of previous research indicated that by and large subjects in this study performed in a similar fashion to subjects in previous research. Lack of group differences, except for the measures of accuracy, and similarity of performance for the male-male group as compared to previous samples did not change the implications for previous research concerning linear and nonlinear conditions effects.

The lack of accuracy of the joint decisions for groups in which female subjects were trained in the nonlinear condition (male-female and female-female groups) indicates that these groups were not capable of using the information as effectively as groups in which male subjects were trained in the nonlinear condition. Since accurate joint decisions were based on an equal and correct utilization of the cues from both linear and nonlinear conditions, inaccurate joint decisions could have resulted from an overemphasis of the importance of one cue as compared to the other and an incorrect usage of one or both cues. However, due to the fact that the joint decisions did not show a capitulation on the part of either subject as indicated by the measures of compromise $\left(\left|\frac{S_i - J}{S_1 - S_2}\right|\right)$ and the amount of cognitive change between training and the joint decision $\left(\left|\frac{T_i - J}{T_1 - T_2}\right|\right)$, the inaccuracy therefore was not due to the overemphasis of one cue as compared to the other. For the inaccuracy to be due to an overemphasis, there would have had to have been capitulation on the part of one subject and a corresponding cognitive change between the training of that

subject and the joint decision.

The inaccuracy thus appeared to be the result of an incorrect usage of information concerning one of the cues. Since group effects were not demonstrated for the measure of overt accuracy $\frac{S_i - Y}{T_i - Y}$ thus showing subjects could work effectively by themselves, and no group effects were found for the measure of convert accuracy $\frac{S_i - Y}{T_i - Y}$, for subjects trained in the nonlinear condition, it becomes evident that the inaccuracy resulted from the inability of a female subject trained in the nonlinear condition to effectively communicate her policy to her partner. This may have been due to either a female subject not understanding her policy well enough to effectively communicate or her partner not understanding her communication.

Some insight may be gained from a study by Greenstein (1961) in which he used subjects from the fourth through eight grades. He demonstrated that males were more informed on politics than females and that males were sought for information concerning politics by both sexes. Thus in the present study the implication appears to be that rather than female subjects incorrectly communicating their policy when trained under the nonlinear condition, it was their partner not accepting the communication as presented by the female subject. In short,it would appear that since males and females did not differ in their ability to <u>learn</u> a complex (non-linear) strategy, the critical point arose when each was trying to convince his partner of the <u>validity</u> of such a strategy. When females espoused a simple, linear, policy, they appear to have been able to convince their partners, but when they attempt to defend or explain a complex policy, their partners (both male and female) appear simply not to believe them.

condition. It was an attempt to clarify or understand a policy, presented by a female, that appeared more difficult in relation to the policy in the linear condition.

The general lack of group differences, however, did not meet the expectations of this study. On the basis of previous research on sex differences, e.g., Vinacke, 1959; Wallach and Caron, 1959, it was expected that males and females would react differently during a cognitive conflict situation and would also resolve the conflict in a different fashion. However it is obvious that the conditions in studies yielding sex differences were not operative in Hammond's paradigm.

The task demands in the paradigm may have been such that differences in the amount of conformity may have been overshadowed by the requirements for achieving correct joint decisions. If one subject conformed to the partner, it would have become evident that such behavior was not resulting in accurate joint judgments due to the immediate feedback at the end of each trial. Therefore, subjects would have to reject such behavior patterns if they wanted to make accurate judgments. Also, if one subject continuously conformed to his partner, accurate joint judgments would most likely only be made if the partner knew the importance of both cues and how to use them. This would be highly unlikely if the conformity occurred, since the conforming subject would probably not attempt to effectively convince his partner of the importance of his policy. The same would be true if one subject continuously attempted to dominate.

Males need not have demonstrated better performance in terms of ability to resist set formation or general problem solving as would be predicted by Guetzkow (1951), Luchins and Luchins (1959), and Nakamura (1958), since both subjects interacted during each of the conflict trials with ample opportunity to exchange information. Thus if a female subject did not understand the reasoning behind correct judgments or formed an incorrect set concerning the problem, her partner had ample opportunity to correct the problem and explain answers given by the experimenter.

It is also possible that the interaction between subjects would have demonstrated sex differences, since it was at this point during a trial that subjects dealt with each other as individuals. Unfortunately data was not collected concerning the verbal exchange between subjects before reaching a joint decision. However, Erol Gungor[6] has demonstrated the feasibility of such a procedure in his investigation of conotative and denotative meaning of words in a cognitive conflict situation.

Another aspect of the paradigm which might mask sex differences is that the paradigm makes no provisions for those cues subjects bring into the experimental situation. Subjects may be using unknown cues in making their judgments. While the paradigm attempts to limit the number of cues used to make a judgment, there is no control for what cues the subject may actually use or how additional cues will effect those given by the experimental procedure.

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[6]Personal communication of unpublished data.

Thus it would seem that sex differences are not an effective variable in the "lens model" paradigm. Cognitive conflict in this instance does not appear to be influenced by the sex of those individuals involved in the conflict. It is also possible that cognitive tasks of this nature transcend sex differences, and that such differences may not be as pervasive as previous research has led us to expect.

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Appendix A

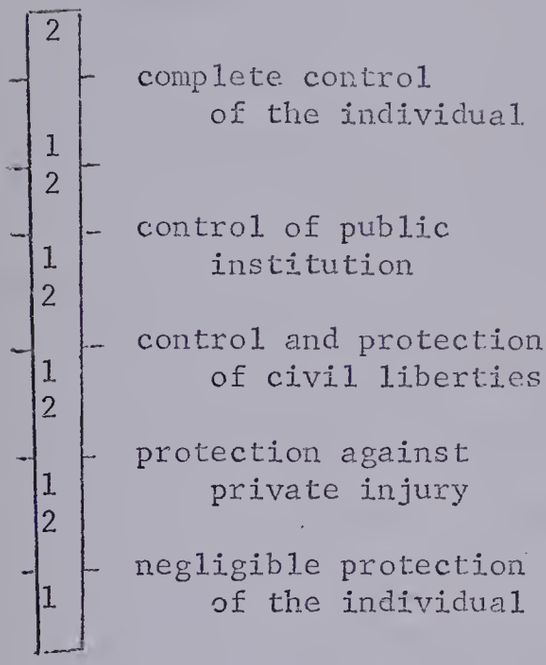
Criterion Card for Predicting "Level of Deomcratic Institutions"

Full representation	4 3 2 1	All citizens represented in decision making - delegated authority periodically reviewed.
Periodic assessment	4 3 2 1	Individuals' views periodically assessed, but top chain of command only indirectly responsive to them.
Chain of power	4 3 2 1	Hierarchy - chain of power - voice of lowest echelon represented only to extent members higher in chain of command pass it on.
Rule by committee	4 3 2 1	Rule by committee - members of committee represent various interests but are not responsible to individuals below them.
Rule by one	4 3 2 1	Rule by one - with advisors appointed by and responsible only to the single executive.

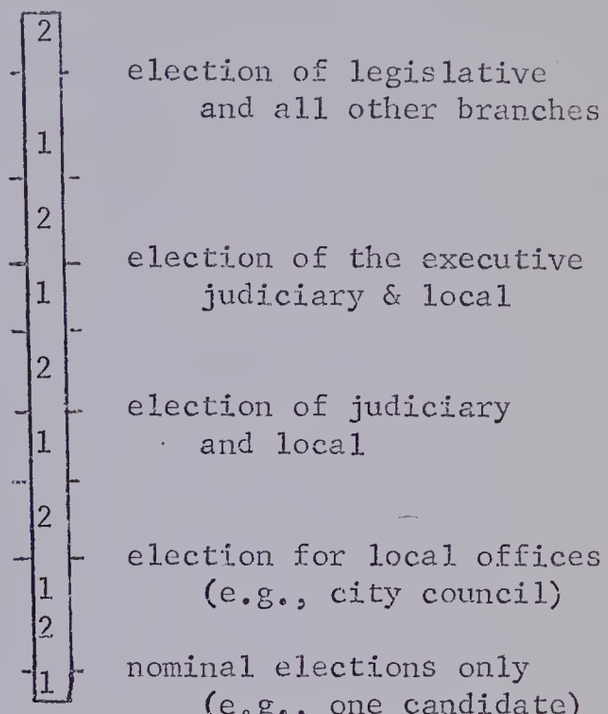
LEVEL OF DEMOCRATIC INSTITUTIONS

Appendix B

Card Showing Linear Cue of "Free Elections" and Nonlinear Cue of "State Control"



State Control



Elections

Appendix C

Instructions Concerning Training Stage

Political Decision Making

1. Purpose

The purpose of the study is to investigate political decision making. Specifically it is directed toward studying aspects of how adminstrators reach decisions about politcal conditions in foreign countries.

With the emergence of new nations, changes in the internal political and economic structure of established nations, and the fluctuations in balance of power in the world, the understanding of the process of decision making in the area of work politics has become increasingly important, and research such as this has been encouraged through granted funds.

Because this is a laboratory study, the decisions in which you will be involved, though real, have been simplified so that certain features of the decision process may be investigated in a relatively "pure" form -- without the interference of various disturbing factors of real world politics. Nevertheless, in order that the information obtained from the study be relevant, it is important that you treat each decision you will make as a real one and do the very best you can.

11. What you will be asked to do

In this study we are interested in learning how people put political facts together and how they reach a decision on the basis of these facts. This is fundamentally a study in decision making. We are not concerned with biases or attitudes.

First we will give you some experience with a certain kind of foreign policy which has actually been employed at certain times. Then you will be given an opportunity to put this policy to work by making some decisions about some real problems.

III. The Policy

The policy you will learn is used to evaluate the political state of affairs in a foreign country. It is actually a highly over-simplified policy because it involves only two political conditions. The policy states that when evaluating a foreign country's democratic potential, two principle variables should be considered.

1. State control of the individual. This is an idea with which you are familiar. In the establishment of any government some control of the individual is invested in the state. If this control is weak, various isolated power groups emerge which limit the priviledges of smaller groups or of non-organized individuals. On the other hand, if too much control of the individual is invested in the state, individual liberty is seriously curtailed. In short, the policy holds that a "reasonable" amount of state control is necessary for democratic development -- an amount lying between the two extremes. Either too little or too much is not appropriate.

2. The extent to which elections determine government. This is a straightforward idea. Elections are the hallmark of democracy. If elections play no part in the determination of government structure, personnel or policy, the people at large have little or no voice in shaping the political or economic

decisions which affect their welfare. In general the more the government can be determined by the electorate the more democratic it is.

The extent to which each of these conditions is predictive of growth of democratic institutions in a country has received considerable study. On the basis of the general findings the policy put forth here indicates that, although both conditions are related to democratic development, one of the conditions is by far more important than the other. Therefore, this condition should be weighed much more heavily in decisions as to the probable future level of democratic institutions in a country.

Thus, the policy deals only with information concerning state control and elections. We will give you information about these two conditions for several nations and ask you to make judgments about the probable growth of democratic institutions in these nations in the next 10 years.

IV. Policy Training

All administrators need experience in the specifics of their tasks. Ordinarily this experience is accumulated over a fairly long period of time. Because the amount of time we have is limited, however, we will give you some concentrated practice in the direct application of the above policy to some specific problems. Your job at this point will be to learn how to weigh the two kinds of information appropriately. When you can do this successfully you will have become an "experienced" administrator in that you will know how to apply the policy.

You will find in front of you a deck of cards. Each of these cards represents a nation. On the face of each card you will see two scales: one providing information about the extent to which state control is exerted over the individual and one providing information about the degree to which the government is determined by elections. On the basis of the information provided in these two scales, you are to predict the probability level of democratic development that will be manifested by the country in ten years. The actual level reached by the country will be found on the back of the card, thus enabling you to see how good your predictions were.

Note that each of the information scales has five levels with two steps within each level. The prediction scale also has five levels but has four steps within each level. You are to give your decision in terms of both the level and the step within the level. On the following page is pictured the prediction scale. You may keep it in front of you to help you in stating your decision.

Remember, the policy under which you are to operate says that you should weigh one of the conditions much more heavily than the other.

You may have questions at this point but most of your questions will be answered by working out a few examples. Please begin now by telling the Research Assistant you are ready. If you have questions after a few trials, please feel free to ask the Research Assistant. It is essential that you understand the task.

Appendix D

Instructions Concerning Conflict Stage

JOINT DECISION INSTRUCTIONS

Now that you have had experience in developing a policy you will have a chance to apply it to real problems. You will make decisions about the level of democratic institutions in several nations chosen from the real world. Please do the very best you can to apply your policy well. Research on political decision making is of great importance.

Listen carefully to the procedures you will follow in working together: I will show you one card at a time. Each of you, without consulting the other person, will make a decision about the situation represented by the card. Write your decision in the top block, Column I for the first card, Column 2 for the second card and so forth. Then, make your decision public; tell the other person what your first decision is.

Since these are real cases they are fairly complex, and your public decisions may be different. If these first public decisions are not the same, you must work together to come to a joint decision. While you are working together to come to a joint decision you may discuss the situation freely -- you may say anything to each other that you want.

When you reach a joint decision tell me what it is and I will record it. This joint decision should be as accurate as you can make it. However, since these are real, complex cases you may still have some reservations about the accuracy of the joint decision.

Therefore, after you have told me your joint decision, record a second private decision in the proper column of the lower block. This second decision should never be revealed to the other person. It must be as accurate as you can make it.

I will repeat this procedure briefly:

One, make a decision and write it in the proper column of the top block.

Two, tell the other person what your decision is.

Three, work together to arrive at a joint decision.

Four, tell me what the joint decision is.

Five, make a second private decision about the situation, record this private decision in the proper column of the bottom block, DO NOT REVEAL THIS SECOND DECISION.

Do you have any questions?

Here is the first card representing a situation in the real world.

Appendix E

Measure of Compromise for Subjects Trained in the Linear Condition

$$\frac{|S_i - J|}{S_1 - S_2}$$ Linear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F.
Sex of S	.79	1	.01	.12
Sex of Partner	.30	1	.03	.47
Sex of S x Sex of Partner	.00	1	.00	.00
Error Term Between Groups	2.34	36	.06	---
Blocks	.71	9	.07	1.95*
Blocks x Sex of S	.45	9	.05	1.24
Blocks x Sex of Partner	.29	9	.03	.80
Blocks x Sex of S x Sex of Partner	.48	9	.05	1.31
Error Term Within Group	13.07	324	.04	---

* $p < .05$

Appendix F

Measure of Compromise for Subjects Trained in the Nonlinear Condition

$$\frac{|S_i - J|}{S_1 - S_2}$$ Nonlinear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.03	1	.03	.60
Sex of Partner	.02	1	.02	.36
Sex of S x Sex of Partner	.12	1	.12	2.11
Error Term Between Groups	2.05	36	.06	---
Blocks	.93	9	.10	2.24*
Blocks x Sex of S	.23	9	.03	.99
Blocks x Sex of Partner	.16	9	.02	.37
Blocks x Sex of S x Sex of Partner	.43	9	.05	1.03
Error Term Within Groups	14.93	324	.05	---

*$p < .05$

Appendix G

Measure of Cognitive Change Between Overt and Covert Judgment

For Subjects Trained in the Linear Condition

$$\frac{|Si - S_i'|}{S_i - J}$$ Linear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.00	1	.00	.13
Sex of Partner	.08	1	.08	.41
Sex of S x Sex of Partner	.06	1	.06	.32
Error Term Between Groups	6.53	36	1.81	---
Blocks	1	9	.11	1.75
Blocks x Sex of S	.85	9	.09	1.50
Blocks x Sex of Partner	.76	9	.08	1.34
Blocks x Sex of S x Sex of Partner	.31	9	.03	.54
Error Term Within Groups	20.52	324	.06	---

Appendix H

Measure of Cognitive Change Between Overt and Covert Judgment

For Subjects Trained in the Nonlinear Condition

$$\frac{\left|S_i - S_i'\right|}{S_i - J}$$ Nonlinear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.05	1	.05	.42
Sex of Partner	.36	1	.36	3.16
Sex of S x Sex of Partner	.25	1	.25	2.14
Error Term Between Groups	4.12	36	.11	---
Blocks	.69	9	.08	1.17
Blocks x Sex of S	.62	9	.07	1.05
Blocks x Sex of Partner	.73	9	.08	1.24
Blocks x Sex of S x Sex of Partner	.33	9	.04	.56
Error Term Within Groups	21.22	324	.07	---

Appendix I

Measure of the Amount the Joint Decision Varies From Training

For Subjects Trained in the Linear Condition

$$\frac{|T_i - J|}{T_1 - T_2}$$ Linear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.03	1	.03	.23
Sex of Partner	.01	1	.01	.08
Sex of S x Sex of Partner	.02	1	.20	1.52
Error Term Between Groups	4.89	36	.14	----
Blocks	1.27	9	.14	3.83**
Blocks x Sex of S	.49	9	.05	1.47
Blocks x Sex of Partner	.25	9	.03	.75
Blocks x Sex of S x Sex of Partner	.16	9	.02	.48
Error Term Within Groups	11.97	324	.37	---

** $p<.01$

Appendix J

Measure of the Amount the Joint Decision Varies From Training

For Subjects Trained in the Nonlinear Condition

$$\frac{|T_i - J|}{T_1 - T_2}$$ Nonlinear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.15	1	.15	.90
Sex of Partner	.12	1	.12	.70
Sex of S x Sex of Partner	.11	1	.11	.70
Error Term Between Groups	5.92	36	.16	---
Blocks	2.03	9	.23	7.12**
Blocks x Sex of S	.43	9	.05	1.49
Blocks x Sex of Partner	.08	9	.01	.28
Blocks x Sex of S x Sex of Partner	.21	9	.02	.75
Error Term Within Groups	10.28	324	.03	---

** $p < .01$

Appendix K

Measure of Overt Accuracy for Subjects Trained in the Linear Condition

$$\frac{|S_i - Y|}{T_i - Y}$$ Linear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.23	1	.23	1.49
Sex of Partner	.02	1	.02	.12
Sex of S x Sex of Partner	.03	1	.03	.19
Error Term Between Groups	5.63	36	.16	---
Blocks	3.17	9	.35	5.98**
Blocks x Sex of S	.16	9	.02	.30
Blocks x Sex of Partner	.30	9	.03	.57
Blocks x Sex of S x Sex of Partner	.57	9	.06	1.07
Error Term Within Groups	19.11	324	.06	---

** $p<.01$

Appendix L

Measure of Overt Accuracy for Subjects Trained in the Nonlinear Condition

$$\frac{|S_i - Y|}{T_1 - Y}$$ Nonlinear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.01	1	.01	.11
Sex of Partner	.50	1	.50	4.08
Sex of S x Sex of Partner	.01	1	.01	.01
Error Term Between Groups	4.44	36	.12	---
Blocks	2.96	9	.33	4.14**
Blocks x Sex of S	.26	9	.03	.37
Blocks x Sex of Partner	.26	9	.03	.36
Blocks x Sex of S x Sex of Partner	.67	9	.07	.94
Error Term Within Groups	25.77	324	.08	---

** $p<.01$

Appendix M

Measure of the Accuracy of the Covert Judgment for Subjects Trained in the Nonlinear Condition

$$\frac{|S_i - Y|}{T_i - Y}$$ Nonlinear Subjects

Source	Sums of Squares	d.f.	Mean Squares	F
Sex of S	.29	1	.29	1.79
Sex of Partner	1.20	1	1.20	.73
Sex of S x Sex of Partner	.01	1	.01	.05
Error Term Between Groups	5.92	36	.16	---
Blocks	2.67	9	.30	4.38**
Blocks x Sex of S	.80	9	.09	1.32
Blocks x Sex of Partner	.70	9	.08	1.15
Blocks x Sex of S x Sex of Partner	.57	9	.06	.93
Error Term Within Groups	21.96	324	.07	---

**$p < .01$